Katie Berg

Midterm Lesson

July 2012

Activity Summary: Students will work in partnerships to discover the purpose and function of plant stems

Unit of Study: Plants

Grade Level: 2nd

Adapted from: <http://learningideasgradesk-8.blogspot.com/2011/03/celery-plant-experiment.html>

Purpose: This lesson targets several Grade 2 Science Standards as described in the NYS Scope and Sequence regarding plant diversity. It is also in line with the Elementary Core Curriculum standards regarding Analysis, Inquiry, and Design and The Living Environment. This lesson helps children understand how the plants we grow in our classroom and in our school’s Eco Center get the water and nutrients they need to grow and survive. This hands-on activity gives the students the concrete visual of colored water moving up through a stem so they can see what happens inside a plant’s stem.

|  |  |
| --- | --- |
| **K-8 Science Scope and Sequence**  **Grade 2**  **Unit 3: Plant Diversity** | **Elementary Science Core Curriculum**  **Standard 1: Analysis, Inquiry and Design**  **Scientific Inquiry** |
| LE 3.1b Identify and compare the physical structures of a variety of plant parts (seeds, leaves, stems, flowers, roots) | S1.3a Clearly express a tentative explanation or description which can be tested |
| LE 1.1b Describe the basic needs of plants   * Light, air, water, soil (nutrients) | S2.3 Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurement of quantities, such as length, mass, volume, temperature, and time |
| LE 1.1b Describe the basic life functions of plants   * LE 4.1b Take in nutrients | S2.3b Record observations accurately and concisely |
|  | **Standard 4: The Living Environment**  Key Idea 1: Living things are both similar to and different from each other and from nonliving things |
|  | 1.1b Plants require air, water, nutrients, and light in order to live and thrive |
|  | Key Idea 3: Individual organisms and species change over time |
|  | 3.1b Each plant has different structures that serve different functions in growth, survival, and reproduction |

Professional Development Standards (Charlotte Danielson’s Framework for Teaching)

Competency 1e: Designing Coherent Instruction

* Learning Activities
* Instructional materials and resources
* Lesson and unit structure

Competency 2c: Managing Classroom Procedures

* Management of instructional groups
* Management of transitions
* Management of materials and supplies

Competency 3b: Using Questioning and Discussion Techniques

* Quality of questions
* Discussion techniques
* Student participation

Competency 3c: Engaging Students in Learning

* Representation of content
* Activities and assignments
* Grouping of students
* Instructional materials and resources
* Structure and pacing

Prior Related Activities:

* Read Aloud: Plant Plumbing: A Book About Roots and Stems Written by Susan Blackaby
* Watch BrainPOP Jr. Videos:
* Scientific Method: <http://www.brainpopjr.com/science/scienceskills/scientificmethod/>
* Science Projects: <http://www.brainpopjr.com/science/scienceskills/scienceprojects/>

Objectives:

1. Students will discover how water and nutrients travel through a plant’s stem.

2. Students will learn about transpiration and how plants breathe.

3. Students will understand how the stem works together with the leaves and roots to help the plant grow.

Materials:

1. A bundle of celery stalks (with leaves attached at the top)

2. White flowers (ex: carnations)

3. Wooden chopsticks

4. Clear straws

5. 1 pencil and 1 stalk of Swiss Chard (for demonstrating the hypothesis step)

6. Clear plastic cups

7. Water (at room temperature)

8. Food coloring (red or blue)

9. Experiment sheet (2 versions)

10. Magnifying lenses

11. Steps of The Scientific Method chart

12. YouTube video: Learn Human Body- Cardiovascular System

13. Diagram of xylem and phloem vessels

14. Rubric to assess student understanding

Lesson Procedure

# 1. Watch YouTube Video: Learn Human Body - Cardiovascular System (through 3:18)

<http://www.youtube.com/watch?v=Ukro0hZZTEg&feature=relmfu>

2. Questions for discussion:

* Make a fist and look at the underside of your wrist. What do you see?
* How does blood get around the human body?—*Turn and Talk*
* Just like how humans need blood to survive, plants need water and nutrients to survive. How do water and nutrients get to all parts of the plant?—*Turn and Talk*

3. Review of scientific method using chart (Purpose, Hypothesis, Materials, Method, Observation, and Conclusion)

4. Model: Put all items the students will be using (a celery stalk, a white flower, a chopstick, and a straw) into a clear plastic cup of water at room temperature with 10 drops of food coloring.

In addition, put pencil and stalk of Swiss Chard into the cup (used to model the hypothesis step.)

Explain that we are using food coloring so we can see how the water travels through the plant.

Draw what you see (the initial set-up).

5. Model: Hypothesis step. Where will the pencil and the Swiss Chard turn color?

Ms. B: I think the pencil will not change color at all.

Ms. H: I think the pencil will not change color at all.

Ms. B: I think the outside of the Swiss Chard will turn the color of the water up to the water level and it will also turn the color of the water inside the stem.

Ms. H: I think the whole Swiss Chard stem and leaf’s veins will turn the color of the water.

6. Students return to their seats to conduct the experiment.

7. Students record **purpose** of the experiment on experiment sheets.

Purpose of experiment: How do water and nutrients get to all parts of the plant?

8. Pass out materials to each partnership.

9. Each student records his/her **hypothesis** about what they think is going to happen to each object in the colored water (Where will the objects turn color?)

10. Partnerships record a list of the **materials** needed to replicate this experiment.

11. Partnerships record the **method** of the experiment: how the experiment is conducted

a) Fill cup with water

b) Add 10 drops of food coloring into cup

c) Put the celery stalk, carnation, chopstick, and straw into the colored water

d) Draw what you see

e) Wait several hours; check on the experiment in 2 hours and then again 24 hours later

12. Circulate from group to group and assess as the students move through the steps of the scientific method.

13. Share: Two partnerships will share their hypotheses and their scientific drawings with the group.

Experiment continued:

14. Put cups aside and return to them in 2 hours to **observe, record, and draw** what happened to the objects in the colored water.

15. Return again the following day to **observe, record, and draw** any more changes.

16. Reiterate the connection between blood flow in the human body and how the nutrients and water flow through a plant. Explain that plants have a special system for moving water and nutrients through their system, much like the human body’s veins and arteries.

17. Teach: Have students look at pieces of celery using magnifying lenses. Have students describe what they observe. (Notice the little tube endings.) Have them try to separate the tubes from the celery stem by breaking the stalk in half.

Show a bundle of straws.

* Explain that all plant stems have similar tubes that carry water and nutrients, taken up by the roots to the leaves, and then the food produced by the leaves moves through the stem to other parts of the plant.
* *Xylem*: tubes inside the stem that carry water and minerals up from the roots to the leaves.
* *Phloem*: tubes inside the stem that carry “food” produced by the leaves to the rest of the plant.
* Their main function is to keep all cells of the plant hydrated and nourished.

18. Model: **conclusion** step. How would you answer your original question? Note if the results match the hypothesis.

19. Each partnership will break their stalk of celery in half to see which parts of the stem are red or blue and which ones aren't. This shows which parts of the stem actually carry the water and nutrients. Each student writes what they have concluded from the experiment.

Differentiation/ Accommodation:

Partnerships can select a more scaffolded experiment sheet with reminders of what each step of the scientific experiment asks for, sentence starters, and lines to write on.

Assessment: Students’ understanding will be evaluated when teacher is circulating throughout the experiment using a rubric, during the share, and after collecting the experiment sheets. Each student will write his/her own hypotheses and conclusion, which will indicate his/her understanding of the experiment and the scientific method.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rubric for “Purpose and Function of Plant Stems” Experiment | | | | |
|  | **4**  **(Above Standard)** | **3**  **(Meets Standard)** | **2**  **(Approaches Standard)** | **1**  **(Far Below Standard)** |
| **Independence** | Student completed the activity independently. | Student completed activity with minimal teacher assistance. | Student required moderate teacher assistance and prompting to complete the activity. | Student required a great deal of teacher assistance and prompting to complete the activity. |
| **Attention and engagement** | Student remained engaged throughout the experiment and was able to assist classmate(s) in need of support. | Student was engaged throughout the experiment with no more than one verbal cue to remain on-task. | Student required 2-3 verbal reminders to remain engaged and on- task throughout the experiment. | Student required more than 4 verbal reminders to remain on-task throughout the experiment. |
| **Student Understanding** | Student understands the specific functions of the stem at a secure level and explores them in greater detail. | Student understands that the stem has specific functions and can explain what the stem does to help the plant survive. | Student has an incomplete understanding of the functions of the stem and what the stem does to help the plant survive. | Student does not recognize that the stem has specific functions and cannot explain what the stem does to help the plant survive. |